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| APPLICATION NO. | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
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| 09/815,305 | 03/23/2001 | Toshiaki Hongo | P 0279274 EL01001CDC | 4649 |

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| EXAMINER | |
|---|---|
| ARANCIBIA, MAUREEN GRAMAGLIA | |
| **ART UNIT** | **PAPER NUMBER** |
| 1763 | |

| MAIL DATE | DELIVERY MODE |
|---|---|
| 05/17/2007 | PAPER |

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

| Office Action Summary | Application No. | Applicant(s) | |
|---|---|---|---|
| | 09/815,305 | HONGO ET AL. | |
| | Examiner | Art Unit | |
| | Maureen G. Arancibia | 1763 | |

*-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --*

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

1)☒ Responsive to communication(s) filed on *20 February 2007*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

4)☒ Claim(s) *46-59* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *46-59* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

**Application Papers**

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

## DETAILED ACTION

### *Continued Examination Under 37 CFR 1.114*

*1.* A request for continued examination under 37 CFR 1.114 was filed in this application after appeal to the Board of Patent Appeals and Interferences, but prior to a decision on the appeal. Since this application is eligible for continued examination under 37 CFR 1.114 and the fee set forth in 37 CFR 1.17(e) has been timely paid, the appeal has been withdrawn pursuant to 37 CFR 1.114 and prosecution in this application has been reopened pursuant to 37 CFR 1.114. Applicant's submission filed on 20 February 2007 has been entered.

### *Claim Rejections - 35 USC § 102 / 35 USC § 103*

2. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

4. **Claims 46, 48, 51-53, 55, 58, and 59 are rejected under 35 U.S.C. 102(b) as anticipated by JP 01-274398A to Nakahigashi et al. or, in the alternative, under 35 U.S.C. 103(a) as obvious over Nakahigashi et al. in view of JP 11-067737A to Koshimizu (the publication of Japanese Patent Application 09-231751). The**

**following rejection refers to the Figures and English Abstract of Nakahigashi et al. The following rejection also refers to U.S. Patent 6,162,323, which issued from the U.S. counterpart application to Japanese Patent Application 09-231751, as an English language equivalent to JP 11-067737A to Koshimizu.**

In regards to Claims 46, 51, 53, and 58, Nakahigashi et al. teaches a plasma processing apparatus (Figure 1) for applying a plasma process to a substrate 7, the plasma processing apparatus comprising: a process chamber 6 in which the substrate 7 is subject to the plasma process; a plasma source (waveguide 3, such as for microwaves; coils 4; Figure 1) that generates plasma in the process chamber; a gas introducing portion (Figure 1) configured to introduce a gas into the process chamber; and an exhaust outlet 16 (Figure 1) that evacuates the gas from the process chamber; wherein the gas introducing portion includes first and second gas introducing portions configured to supply a first gas and a second gas, wherein each of the first and second gas introducing portions includes an inlet port 14, an outlet port 15, a gas passage 12 connected to the respective inlet and outlet ports, and a plurality of gas nozzles (apertures in respective plates 13) connected to the respective gas passage; and wherein a gas exhaust line is directly connected to each of the respective outlet ports 15 of the respective gas introducing portions.

A review of the Figures of Nakahigashi et al. and a targeted oral translation of Nakahigashi et al. could not reveal whether Nakahigashi et al. teaches that each of the exhaust outlet 16 and the two respective outlet ports 15 are connected to respective vacuum devices, as recited in Claims 46 and 51, or that the two respective outlet ports

15 are connected to bypass lines that connect the outlet ports to a common vacuum device that is connected to exhaust outlet 16, as recited in Claims 53 and 58. A full translation of Nakahigashi et al. has been requested.

Nevertheless, Examiner argues that it is implicit in the known teachings of Nakahigashi et al. that *either* independent vacuum devices are provided, as recited in Claims 46 and 51, *or* that a common vacuum device is provided, with bypass lines connecting the respective outlet ports 15 to the common vacuum device, as recited in Claims 53 and 58. In other words, Examiner argues that Nakahigashi et al. anticipates *at least either* Claims 46 and 51 *or* Claims 53 and 58.

In so far as it cannot be determined at this time which of these two claimed arrangements is anticipated by Nakahigashi et al., an alternative rejection of the claims is made as being obvious under 35 U.S.C. 103 over Nakahigashi et al. in view of Koshimizu.

Koshimizu teaches that the outlet 602 of a processing chamber 134 and an outlet 608 of a gas introducing portion 132 can be connected to a common vacuum device 606, with a bypass line connecting the outlet 608 of the gas introducing portion 132 to the vacuum device (Figure 4; Column 10, Lines 13-30); or alternatively, that the outlet 602 of a processing chamber 134 and an outlet 608 of a gas introducing portion 132 can be connected to independent vacuum devices 902, 904, respectively (Figure 7; Column 12, Lines 30-53).

It would have been obvious to one of ordinary skill in the art to modify the apparatus taught by Nakahigashi et al. to have either a common vacuum device shared

by all the outlets, as recited in Claims 53 and 58, or to have independent vacuum devices connected to each of the outlets, as recited in Claims 46 and 51, as taught by Koshimizu. The motivation for providing a common vacuum device, as taught by Koshimizu (Column 10, Lines 61-64), would have been to have an apparatus of decreased cost. The motivation for providing independent vacuum devices, as taught by Koshimizu (Column 11, Lines 8-11), would have been to have the ability for quicker evacuation of the processing chamber or gas introducing portion, thereby improving the throughput.

In regards to Claims 48 and 55, Nakahigashi et al. teaches that the gas introducing portion is of a showerhead type having a surface facing the substrate 7 and provided with a plurality of holes. (Figures 1 and 2)

In regards to Claims 52 and 59, Nakahigashi et al. teaches that a diameter of the respective outlet ports 15 is larger than a diameter of the gas nozzles (apertures in respective plates 13). (Figures 1 and 2)

**5. Claims 47, 49, 54, and 56 are rejected under 35 U.S.C. 103(a) as being unpatentable over Nakahigashi et al., or alternatively, over Nakahigashi et al. in view of Koshimizu, as applied to claims 46 and 53 above, and further in view of U.S. Patent 6,270,862 to McMillin et al.**

The teachings of Nakahigashi et al. and Koshimizu were discussed above.

In regards to Claims 47, 50, 54, and 56, Nakahigashi et al., or alternatively, the combination of Nakahigashi et al. and Koshimizu, do not expressly teach that the gas introducing portions and gas passages are formed in an annular ring shape.

McMillin et al. teaches that a gas introducing portion 170 with a gas passage is formed in an annular ring shape. (Figure 2a)

It would have been obvious to one of ordinary skill in the art to modify the teachings of Nakahigashi et al., or alternatively, the combination of Nakahigashi et al. and Koshimizu, to form the gas introducing portions and gas passages in an annular ring shape, as taught by McMillin et al. The motivation for making such a modification, as taught by McMillin et al. (Column 5, Lines 33-38), would have been to provide an increased deposition rate and improved uniformity on the substrate, compared to the conventional (i.e. showerhead; Column 1, Lines 25-30) gas distribution systems.

**6. Claims 50 and 57 are rejected under 35 U.S.C. 103(a) as being unpatentable over Nakahigashi et al., or alternatively, over Nakahigashi et al. in view of Koshimizu, as applied to claims 46 and 53 above, and further in view of U.S. Patent Application Publication 2002/0011215 to Tei et al.**

The teachings of Nakahigashi et al. and Koshimizu were discussed above.

In regards to Claims 50 and 57, Nakahigashi et al., or alternatively, the combination of Nakahigashi et al. and Koshimizu, do not expressly teach that the plasma source includes a flat antenna having a plurality of slits.

Tei et al. teaches that a plasma source includes a flat antenna 111 having a plurality of slits 111S (Figures 1 and 3).

It would have been obvious to one of ordinary skill in the art to modify the plasma source of Nakahigashi et al., or alternatively, the combination of Nakahigashi et al. and Koshimizu, to include a flat antenna having a plurality of slits, as taught by Tei et al.

The motivation for doing so, as taught by Tei et al. (Paragraphs 76-80), would have been to provide a microwave supply plane to adjust the distribution of microwaves transmitted from the waveguide to the processing chamber, and thereby to adjust the plasma intensity for surface treatment.

***Response to Arguments***

7. Applicant's arguments with respect to the pending claims have been considered but are moot in view of the new ground(s) of rejection.

***Conclusion***

8. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Maureen G. Arancibia whose telephone number is (571) 272-1219. The examiner can normally be reached on core hours of 10-5, Monday-Friday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Parviz Hassanzadeh can be reached on (571) 272-1435. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

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